CLAIMS

What is claimed is:

1. An electroporation device for implantation within a body, the device comprising:

a housing;

at least one lead extending from the housing, the at least one lead having a therapy electrode associated therewith, the therapy electrode operable to selectively electroporate tissue within the body; and

logic and control circuitry located within the housing and operable to control the therapy electrode.

2. The device of claim 1, further comprising sensor circuitry associated with the housing, the sensor circuitry operable to sense a biological parameter and provide a sense signal to the logic and control circuitry in response to the biological parameter.

3. The device of claim 2, wherein in the biological parameter is temperature.

4. The device of claim 2, wherein the biological parameter is concentration of a treatment drug.

5. The device of claim 2, wherein the sense signal comprises a feedback signal that at least partially controls the electroporation device.

6. The device of claim 1, further comprising an energy source associated with the housing.

7. The device of claim 6, further comprising a current converter coupled to the energy source.

8. The device of claim 1, further comprising an electrical pulse generator associated with the housing and operable to deliver at least one electrical pulse to the body via the therapy electrode.

9. The device of claim 8, wherein the at least one electrical pulse produces an electric field strength of about 700 V/cm to about 1500 V/cm.

10. The device of claim 8, wherein the at least one electrical pulse has a pulse width of about 50 microseconds to about 200 microseconds.

11. The device of claim 1, further comprising a high frequency generator associated with the housing and operable to deliver a high frequency stimulus to the body via the therapy electrode.

12. The device of claim 1, further comprising electrocardiogram circuitry operable to measure an electrocardiogram of the body and detect a qRs complex from the electrocardiogram.

13. The device of claim 1, further comprising impedance measuring circuitry operable to measure impedance between a portion of the at least one lead and either the housing or a second lead.

14. The device of claim 1, further comprising telemetry circuitry coupled to the logic and control circuitry, the telemetry circuitry operable to wirelessly communicate with a programming device located outside the body.

15. The device of claim 1, further comprising memory circuitry coupled to the logic and control circuitry, the memory circuitry operable to store information associated with the electroporation device.

16. The device of claim 1, further comprising a drug catheter associated with the housing, the drug catheter operable to deliver a drug to the body under control of the logic and control circuitry.

17. The device of claim 16, wherein the drug catheter is incorporated in the at least one lead.

18. The device of claim 16, further comprising a drug reservoir associated with the housing, the drug reservoir in fluid communication with the drug catheter.

19. An electroporation treatment device for implantation within a body, the device comprising:

a housing;

at least one lead extending from the housing, the at least one lead having a therapy electrode located proximate a distal end of the at least one lead, the therapy electrode operable to selectively electroporate tissue within the body;

logic and control circuitry located within the housing and operable to control the therapy electrode; and

a drug catheter associated with the housing, the drug catheter operable to deliver a drug to the body under control of the logic and control circuitry.

20. The device of claim 19, wherein the housing further comprises a drug reservoir to hold a quantity of the drug, the drug reservoir operatively coupled to the drug catheter.

21. The device of claim 19, further comprising a pump operable to transport the drug through the drug catheter.

22. The device of claim 19, wherein the drug catheter is formed within the at least one lead.

23. The device of claim 19, further comprising a temperature sensor associated with the at least one lead.

24. The device of claim 23, wherein the temperature sensor is located proximate the distal end of the at least one lead.

25. The device of claim 23, further comprising sensor circuitry in communication with the logic and control circuitry, the sensor circuitry operable to receive and process a sense signal received from the temperature sensor.

26. The device of claim 19, further comprising an electrical pulse generator associated with the housing, the electrical pulse generator operable to deliver voltage pulses to the body via the therapy electrode.

27. The device of claim 26, wherein the voltage pulses produce an electric field strength of about 700 V/cm to about 1500 V/cm.

28. The device of claim 26, wherein the voltage pulses each have a pulse width of about 50 microseconds to about 200 microseconds.

29. The device of claim 19, further comprising a high frequency generator associated with the housing, the high frequency generator operable to deliver a high frequency stimulus to the body via the therapy electrode.

30. The device of claim 19, further comprising impedance measuring circuitry associated with the housing, the impedance measuring circuitry

operable to measure impedance between the therapy electrode and the housing.

31. The device of claim 19, further comprising telemetry circuitry associated with the housing, the telemetry circuitry operable to permit wireless communication between the logic and control circuitry and a programming device located outside the body.

32. The device of claim 19, further comprising memory circuitry coupled to the logic and control circuitry, the memory circuitry operable to store information associated with the electroporation treatment device.

33. The device of claim 19, further comprising electrocardiogram circuitry operable to measure an electrocardiogram of the body and detect a qRs complex from the electrocardiogram.

34. An electroporation treatment device for implantation within a body, the device comprising:

a housing;

a first lead extending from the housing, the first lead having a first therapy electrode located proximate a distal end of the first lead;

a second lead extending from the housing, the second lead having a second therapy electrode located proximate a distal end of the second lead, wherein one or both of the first therapy electrode and the second therapy electrode are operable to selectively electroporate tissue within the body; and

logic and control circuitry located within the housing and operable to control one or both of the first therapy electrode and the second therapy electrode.

35. The device of claim 34, further comprising a drug concentration sensor associated with one or both of the first lead and the second lead.

36. The device of claim 34, further comprising a temperature sensor associated with one or both of the first lead and the second lead.

37. The device of claim 34, further comprising sensor circuitry in communication with the logic and control circuitry, the sensor circuitry operable to receive and process signals received from one or both of a drug concentration sensor and a temperature sensor.

38. The device of claim 34, further comprising an electrical pulse generator associated with the housing, the electrical pulse generator operable to deliver one or more voltage pulses to the body via one or both of the first therapy electrode and the second therapy electrode.

39. The device of claim 38, wherein the one or more voltage pulses produce an electric field strength of about 700 V/cm to about 1500 V/cm.

40. The device of claim 38, wherein the one or more voltage pulses has a pulse width of about 50 microseconds to about 200 microseconds.

41. The device of claim 34, further comprising a high frequency generator associated with the housing, the high frequency generator operable to deliver a high frequency stimulus to the body via one or both of the first therapy electrode and the second therapy electrode.

42. The device of claim 34, further comprising impedance measuring circuitry associated with the housing, the impedance measuring circuitry operable to measure impedance between two or more of the first therapy electrode, the second therapy electrode, and the housing.

43. The device of claim 34, further comprising telemetry circuitry associated with the housing, the telemetry circuitry operable to permit

wireless communication between the logic and control circuitry and a programming device located outside the body.

44. The device of claim 34, further comprising memory circuitry coupled to the logic and control circuitry, the memory circuitry operable to store information associated with the electroporation treatment device.

45. The device of claim 34, further comprising electrocardiogram circuitry operable to measure an electrocardiogram of the body and detect a qRs complex from the electrocardiogram.

46. A method for treating a cancerous tumor, comprising:

implanting an electroporation device in a body;

delivering a drug to the body and proximate the cancerous tumor; and

delivering, with the electroporation device, at least one electrical pulse across at least a portion of the cancerous tumor.

47. The method of claim 46, sensing at least one biological parameter and providing a sense signal based on the biological parameter.

48. The method of claim 47, further comprising controlling delivery of the at least one electrical pulse based on the sense signal.

49. The method of claim 46, further comprising detecting a qRs complex from an electrocardiogram of the body and synchronizing the delivering of the at least one electrical pulse with the qRs complex.

50. The method of claim 46, further comprising measuring impedance across a portion of the cancerous tumor and comparing the impedance to a threshold impedance value.

51. The method of claim 50, further comprising suspending delivery of additional electrical pulses based on a result of comparing the impedance to the threshold impedance value.

52. The method of claim 46, wherein delivering the drug to the body comprises delivering the drug via an external drug delivery apparatus.

53. The method of claim 46, wherein delivering the drug to the body comprises delivering the drug through a drug catheter coupled to a housing of the electroporation device, the drug catheter in fluid communication with a drug reservoir located within the housing.

54. The method of claim 46, further comprising increasing a temperature of the body in the vicinity of the cancerous tumor prior to delivering the at least one electrical pulse.

55. The method of claim 54, wherein increasing the temperature of the body in the vicinity of the cancerous tumor comprises delivering a high frequency stimulus with the electroporation device.

56. The method of claim 46, further comprising programming the electroporation device to deliver a particular therapy profile.

57. The method of claim 56, wherein programming the electroporation device occurs after implantation.

58. A method for treating cancer, comprising:

implanting an electroporation device in a body, the electroporation device operable to selectively electroporate tissue within the body using at least one lead having a therapy electrode associated therewith; and

locating the therapy electrode in or proximate a cancerous tumor;

applying a high frequency stimulus in the vicinity of the cancerous tumor with the at least one therapy electrode, thereby raising a temperature in the vicinity of the cancerous tumor;

delivering a drug to the body in the vicinity of the cancerous tumor; and

delivering, with the electroporation device, at least one electrical pulse in the vicinity of the cancerous tumor.

59. The method of claim 58, further comprising sensing the temperature in the body and providing a sense signal based on the temperature.

60. The method of claim 58, further comprising detecting a qRs complex from an electrocardiogram of the body and synchronizing the delivering of the at least one electrical pulse with the qRs complex.

61. The method of claim 58, further comprising measuring impedance across a portion of the cancerous tumor and comparing the impedance to a threshold impedance value.

62. The method of claim 61, comprising suspending delivery of additional electrical pulses based on a result of comparing the impedance to the threshold impedance value.

63. The method of claim 58, wherein delivering the drug to the body comprises delivering the drug through a drug catheter coupled to a housing of the electroporation device, the drug catheter in fluid communication with a drug reservoir located within the housing.

64. The method of claim 58, wherein delivering the drug to the body comprises delivering the drug via an external drug delivery apparatus.

65. The method of claim 58, wherein the cancerous tumor is a breast carcinoma.

66. The method of claim 58, wherein the cancerous tumor is a osteosarcoma.

67. The method of claim 58, wherein delivering the at least one electrical pulse comprises delivering about four to about eight electrical pulses.

68. The method of claim 58, wherein delivering the at least one electrical pulse comprises delivering at least one electrical pulse producing an electric field strength of about 700 V/cm to about 1500 V/cm.

69. The method of claim 58, wherein delivering the at least one electrical pulse comprises delivering at least one electrical pulse having a pulse width of about 50 microseconds to about 200 microseconds.

70. The method of claim 58, further comprising programming the electroporation device to deliver a specific therapy profile.

71. The method of claim 70, wherein programming the electroporation device occurs after implantation.

72. A method for treating cancer, comprising:

implanting an electroporation device in a body, the electroporation device operable to selectively electroporate tissue within the body using at least one lead having a therapy electrode associated therewith;

sensing a temperature in the body and providing a sense signal based upon the temperature;

locating the therapy electrode in or proximate a tumor;

delivering a drug to the body;

applying a high frequency stimulus in the vicinity of the tumor with the therapy electrode, thereby raising a temperature in or around the tumor to at least a threshold temperature; and

delivering, with the electroporation device, at least one electrical pulse in the vicinity of the tumor.

73. The method of claim 72, further comprising detecting a qRs complex from an electrocardiogram of the body and synchronizing the delivering of the at least one electrical pulse with the qRs complex.

74. The method of claim 72, further comprising measuring impedance across a portion of the tumor and comparing the impedance to a threshold impedance value.

75. The method of claim 74, comprising suspending delivery of additional electrical pulses based on a result of comparing the impedance to the threshold impedance value.

76. The method of claim 72, wherein delivering the at least one electrical pulse comprises delivering about four to about eight electrical pulses.

77. The method of claim 72, wherein delivering the at least one electrical pulse comprises delivering at least one electrical pulse producing an electric field strength of about 700 V/cm to about 1500 V/cm.

78. The method of claim 72, wherein delivering the at least one electrical pulse comprises delivering at least one electrical pulse having a pulse width of about 50 microseconds to about 200 microseconds.

79. The method of claim 72, wherein the tumor is a breast carcinoma.

80. The method of claim 72, wherein the tumor is an osteosarcoma.

81. The method of claim 72, further comprising detecting a drug concentration within the body.

82. A system for treating a cancerous tumor within a body, the system comprising:

an implantable and programmable electroporation device, comprising:

a housing;

at least one lead extending from the housing, the at least one lead having a therapy electrode associated therewith, the therapy electrode operable to selectively electroporate tissue within the body;

logic and control circuitry located within the housing and operable to control the therapy electrode; and

first telemetry circuitry associated with the logic and control circuitry; and

an external programming device, comprising:

programming circuitry operable for use in programming the implantable and programmable electroporation device; and

second telemetry circuitry associated with the programming circuitry, wherein the second telemetry circuitry is operable to communicate with the first telemetry circuitry to permit programming of the implantable and programmable electroporation device.

83. The system of claim 82, wherein the first telemetry circuitry and the second telemetry circuitry are operable to permit bi-directional communication.